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| 10/590,234 | 08/22/2006 | Masanobu Aizawa | Q95621 | 6972 |
| 23373 7590 09/28/2010 SUGHRUE MION, PLLC 2100 PENNSYLVANIA AVENUE, N.W. SUITE 800 WASHINGTON, DC 20037 | | | | |
| EXAMINER | | | | |
| KURTZ, BENJAMIN M | | | | |
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

sughrue@sughrue.com
PPROCESSING@SUGHRUE.COM
USPTO@SUGHRUE.COM

Office Action Summary

Application No.

10/590,234

Applicant(s)

AIZAWA, MASANOBU

Examiner

BENJAMIN KURTZ

Art Unit

1797

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 July 2010.
2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3,5 and 7-15 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) 1,3,5 and 7-15 is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
10) ☒ The drawing(s) filed on 22 August 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB-08)
Paper No(s)/Mail Date _____
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____

DETAILED ACTION

Claims 1, 3, 5, 7-15 are pending.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

1. Claims 1, 3, 5 and 7-15 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claim 1 recites, "...the porous substrate comprises a base layer and foundation layer which is formed on the base layer and is formed **of** the zeolite membrane..." The specification does not provide any support for the foundation layer being formed of a zeolite membrane. The specification recites the foundation layer being formed **for** the zeolite membrane (paragraph 9) but not **of** the zeolite membrane.

Claims 3, 5 and 7-15 are rejected as depending from claim 1.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 1, 3, 5 and 7-15 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 recites, "...the porous substrate comprises a base layer and foundation layer which is formed on the base layer and is formed of the zeolite membrane..."

Claim 1 also recites the zeolite membrane is formed over the surface of the porous substrate. It is unclear how the zeolite membrane can be both the foundation layer and also be formed on the foundation layer. For examination purposes it is assumed the foundation layer contains zeolite.

Claims 3, 5 and 7-15 are rejected as depending from claim 1.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. **Claims 1, 3-5 and 9-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lai et al. US 5 871 650 and Verduijn et al. US 6 090 289 in view of Goldsmith et al. US 5 221 484.**

Claims 1 and 3, 5, Lai, Verduijn teach a separation membrane comprising: a porous substrate which is made of ceramic sintered body of which a main ingredient is alumina, and a zeolite membrane which is formed over the surface of the porous substrate, wherein the porous substrate comprises a base layer and a foundation layer which is formed on the base layer and formed of zeolite (Lai, col. 6, lines 16-25; Verduijn, col. 10, lines 10-15) and wherein the separation membrane is characterized in that a mean pore diameter of the foundation layer is smaller than a mean pore diameter of the base layer (Lai, col. 4, line 50-55, col. 5, line 45 – col. 6, line 5; Verduijn, col. 4, lines 47-64, col. 5, lines 1-47). None of these references teach the claimed nitrogen gas permeation rate or the flux Q of 5.0kg/(m² hr) or more.

Lai further teaches the claimed thickness of the foundation layer and that the substrate pore size and thickness should be chosen such that the mass transfer resistance does not limit the flux of material permeating through the membrane (col. 5, lines 60-66). One skilled in the art would be led by the teachings of Lai to adjust the pore size and thickness of the base layer and foundation layer to achieve a suitable flux of material through the membrane.

Goldsmith teaches a separation membrane comprising: a porous substrate which is made of ceramic sintered body of which a main ingredient is alumina, and a zeolite membrane which is formed over the surface of the porous substrate, wherein the porous substrate comprises a base layer and a foundation layer which is formed on the base layer and, wherein the separation membrane is characterized in that a mean pore

diameter of the foundation layer is smaller than a mean pore diameter of the base layer (col. 6, lines 60-66, col. 7, lines 4-36, col. 8, lines 7-13).

Goldsmith further teaches the mean pore diameter of the base layer is about 5 microns or greater, and the mean pore diameter of the foundation layer is 0.1-5 microns (col. 7, lines 4-36); and the thickness of the foundation layer is less than 100 microns (col. 7, lines 24-36).

Verduijn further teaches the thickness of the base layer is 3mm (col. 16, lines 24-30); and the thickness of the foundation layer is in the range of 0.1-150 microns (col. 5, lines 1-12).

All the claimed dimensions are known in the prior art. Verduijn teaches the claimed thickness of the base layer as detailed above and Goldsmith teaches the claimed pore diameters of the base layer and the foundation layer as detailed above. The claimed nitrogen gas permeation rates and the flux are based on the physical dimensions of the membrane. The claimed dimensions of the pore diameters are known in the art and one of ordinary skill in the art would be lead by the teachings of Lai to adjust the pore size to achieve optimal flux of material through the membrane. A membrane with the claimed pore dimensions and thickness would inherently have the claimed nitrogen permeation rates. Also, the separation factor is dependent on what materials are being separated. The separation factor will be different for separating ethanol from water than a separation factor for separating ethanol from benzene. Therefore, the separation factor is deemed to be a process limitation that does not add any further structural limitations to the claim. Even so, the recitation of the separation

factor being 1000 or more would be an inherent property of the membrane as the separation factor is determined by the physical structure of the membrane, such as, materials used, pore size and the thickness of the different layers. All of the physical characteristics are known in the art and the combination of the characteristics would have been obvious to one of ordinary skill in the art. The separation factor is therefore deemed to be inherent in the membrane taught by the prior art. The claims would have been obvious because the technique for improving a particular class of devices was part of the ordinary capabilities of a person of ordinary skill in the art, in view of the teaching of the technique for improvement in other situations, *KSR International Co. v. Teleflex Inc.*, 82 USPQ2d 1385 (2007).

The recitation of the separation membrane being for separating water from organic solvent is merely a recitation of intended use that does not add any further structural limitations to the apparatus of claim 1. The separation membrane as taught by Lai, Verduijn and Goldsmith is capable of performing the recited intended use.

Claims 9, 10, 13 and 14, Lai, Verduijn and Goldsmith further teach the porosity of the substrate is in the range of 20-50% (Lai, col. 6, line 1), the porosity if the substrate is 33% (Verduijn, col. 16, lines 24-30) and the porosity of the substrate is 40% or greater (col. 7, lines 14-18); and the total content of Ca and K included in the porous substrate is not more than 0.5 mol%, Lai, Verduijn and Goldsmith do not mention any Ca or K being present anywhere in the disclosure.

Claims 11 and 12, Verduijn further teaches the porous substrate has a pore size in the range on 0.08-0.16 microns with a narrow pore size distribution (col. 5, lines 30-

35). Therefore the maximum pore diameter would not be more than 7 microns. How the maximum pore diameter is determined is a process limitation that does not further structurally limit the membrane.

Claim 15 recites a method for making the membrane of claim 1. Lai, Verduijn and Goldsmith teach the membrane of claim 1 as detailed above. "[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." In re Thorpe, 227 USDQ 964 (1985). The process of making the membrane according to Lai, Verduijn and Goldsmith is deemed a structural alternative to the recited method of claim 15.

4. Claims 7 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lai '650, Verduijn '289, Goldsmith '484 as applied to claim 1 and further in view of Moyer et al. US 5 198 007.

Lai, Verduijn and Goldsmith teach the separation membrane of claim 1 as detailed above but do not teach the claimed aspect ratio of the particles used to form the foundation layer. Moyer teaches a sintered ceramic media of alumina made of particles. Moyer teaches the aspect ratio of the particles determines the pore size of the filter. The claimed aspect ratios would have been obvious because the design

incentives, to manipulate the pore sizes to obtain a suitable porous product, provided a reason to make an adaptation, and the invention resulted from application of prior knowledge in a predictable manner, *KSR International Co. v. Teleflex Inc.*, 82 USPQ2d 1385 (2007).

Response to Arguments

5. Applicant's arguments filed 7/30/10 have been fully considered but they are not persuasive.

Applicant arguments are addressed in the body of the rejection above.

Conclusion

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to BENJAMIN KURTZ whose telephone number is (571)272-8211. The examiner can normally be reached on Monday through Friday 8:00am to 4:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Duane Smith can be reached on 571-272-1166. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Benjamin Kurtz
Examiner
Art Unit 1797

/Benjamin Kurtz/
Examiner, Art Unit 1797